CLAIMS

What is claimed is:

1. An adsorption filter material for producing protective materials, comprising:

first and second layers; and

an adsorption layer arranged between said first and second layers, wherein the adsorption layer includes a first activated carbon layer having activated carbon particles comprising at least one of granules and spherules of activated carbon, said adsorption layer further comprising activated carbon fibers.

2. The adsorption filter material of claim 1, wherein said adsorption layer further comprises a second activated carbon layer, said activated carbon fibers being arranged in said second activated carbon layer.

3. The adsorption filter material of claim 1, wherein said activated carbon fibers are arranged in said first activated carbon layer.

4. The adsorption filter material of claim 1, wherein said activated carbon particles are produced by carbonization and subsequent activation of suitable granular or spherical organic starting materials.

5. The adsorption filter material of claim 1, wherein said activated carbon particles of said first activated carbon layer have a mean particle diameter of 0.05 to 1 mm.

6. The adsorption filter material of claim 1, wherein said activated carbon particles have a specific surface (BET) of at least 800 m^2/g, and up to 1,500 m^2/g.

7. The adsorption filter material of claim 1, wherein said activated carbon fibers are produced by carbonization and subsequent activation of suitable organic starting fibers.

8. The adsorption filter material of claim 7, wherein said organic starting fibers are selected from the group comprising cellulose fibers, fibers based on cellulose derivatives, phenol resin fibers, polyvinyl alcohol fibers, pitch fibers, acrylic resin fibers, polyacrylonitrile fibers, aromatic polyamide fibers, formaldehyde resin fibers, divinylbenzene-crosslinked polystyrene fibers, lignin fibers, cotton fibers, and hemp fibers.

9. The adsorption filter material of claim 1, wherein said activated carbon fibers comprise an activated carbon fiber textile material.

10. The adsorption filter material of claim 1, wherein said activated carbon fibers have a mean fiber diameter of 1-25 µm.

11. The adsorption filter material claim 1, wherein said activated carbon fibers have a length-specific weight (titer) of 1-10 dtex.

12. The adsorption filter material claim 1, wherein the mean particle diameter of said activated carbon particles is at least three times greater than the mean fiber diameter of the activated carbon fibers.

13. The adsorption filter material of claim 1, wherein a total amount of activated carbon in said activated carbon particles and said activated carbon fibers in said adsorption filter material is 25-300 g/m^2.

14. The adsorption filter material of claim 2, wherein said first activated carbon layer and said second activated carbon layer are arranged relative to each other such that they border directly on each other or are arranged one directly above the other.

15. The adsorption filter material of claim 1, wherein at least one of said activated carbon particles and said activated carbon fibers are impregnated with a catalyst.

16. The adsorption filter material of claim 15, wherein said catalyst is selected from among metals and metal compounds, said metals being selected from the group comprising copper, cadmium, silver, platinum, palladium, zinc, and mercury, and their compounds.

17. The adsorption filter material of claim 15, wherein said catalyst is impregnated by an amount equal to 0.01 to 15 wt.% of said at least one of said activated carbon particles and said activated carbon fibers.

18. The adsorption filter material of claim 1, wherein at least one of said first layer and said second layer is an air-permeable textile material.

19. The adsorption filter material of claim 1, wherein at least one of said first layer and said second layer is rendered oleophobic.

20. The adsorption filter material of claim 1, wherein at least one of said first layer and said second layer is a support layer for said adsorption layer.

21. The adsorption filter material of claim 2, wherein one of said first layer and said second activated carbon layer comprises a support layer for said first activated carbon layer, and wherein one of said second layer and said first activated carbon layer comprises a support layer for said second activated carbon layer.

22. The adsorption filter material of claim 1, wherein said adsorption filter material is formed as an air-permeable multilayer composite material that comprises several layers joined together.

23. The adsorption filter material of claim 1, wherein said adsorption filter material has a total weight of 75-1,000 g/m^2.

24. The adsorption filter material of claim 1, wherein said adsorption filter material is gas-permeable and air-permeable, and the gas-permeability and air-permeability of said adsorption filter material is greater than 50 $L \cdot m^{-2} \cdot s^{-1}$, and as high as 10,000 $L \cdot m^{-2} \cdot s^{-1}$.

25. The adsorption filter material of claim 1, wherein said adsorption filter material has a water vapor permeability of at least 5 L/m^2 per 24 h.

26. The adsorption filter material of claim 1, further comprising at least one barrier layer between said adsorption layer and at least one of said first and second layers.

27. The adsorption filter material of claim 26, wherein said barrier layer is designed to be permeable to water vapor and essentially impermeable to gas and air.

28. The adsorption filter material of claim 26, wherein said barrier layer is at least essentially impermeable at least retards passage of toxic chemical agents and chemical warfare agents.

29. The adsorption filter material of claim 26, wherein said barrier layer is at least essentially impermeable or at least retards the passage of liquids and aerosols.

30. The adsorption filter material of claim 26, wherein said barrier layer is applied as a continuous closed layer on one of said first and second layers.

31. The adsorption filter material of claim 26, wherein a thickness of said barrier layer is 5-500 µm.

32. The adsorption filter material of claim 26, wherein said barrier layer comprises at least one of a plastic and an organic polymer.

33. The adsorption filter material of claim 26, wherein said barrier layer comprises one of a multilayer laminate and a multilayer composite comprising several layers of plastic or polymer.

34. The adsorption filter material of claim 26, wherein said adsorption filter material has a water vapor permeability of at least 10 L/m^2 per 24 h with said barrier layer at a thickness of 50 µm.

35. The adsorption filter material of claim 2, wherein said adsorption filter material is a composite material with several successive layers bonded to one another, wherein said adsorption filter material contains the following layers in sequence:

said first layer, wherein said first layer comprises a textile that has been rendered oleophobic;

a water vapor-permeable and at least essentially gas-impermeable and air-impermeable barrier layer;

said adsorption layer, wherein said adsorption layer comprises said first activated carbon layer with said activated carbon particles and said second activated carbon layer with activated carbon fibers; and

said second layer, wherein said second layer comprises a textile layer.

36. The adsorption filter material of claim 1, wherein said adsorption filter material is thermally stable.

37. Use of the adsorption filter material of claims 1 for producing protective materials.

38. The use of the adsorption filter material of claim 37, wherein said protective materials are selected from the group consisting of protective suits for civilian or military use, protective gloves and protective covers.

39. Use of the adsorption filter material of claim 1 for producing filters and filter materials for the removal of noxious substances, foul-smelling substances, and toxic substances of all types from air and gas flows, the filters and filter materials being selected from the group consisting of gas mask filters, deodorant filters, surface filters, air filters, filters for room air purification, adsorptive support structures, and filters or filter materials for medical applications.

40. A protective material including one of a protective suit, a protective glove, and a protective cover, produced using said adsorption filter material of claim 1 and including said adsorption filter material.

41. A method for improving the breakthrough behavior of an adsorption filter material having a first layer, a second layer, and an adsorption layer arranged between the first layer and the second layer, said method comprising the step of forming the adsorption layer using a combination of activated carbon fibers and granular or spherical activated carbon particles, such that the activated carbon particles and the

activated carbon fibers are present in one of a single activated carbon layer or in separate activated carbon layers which border each other.